

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 53-24871	<b>FOR FURTHER ACTION</b>	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US05/04821	International filing date ( <i>day/month/year</i> ) 15 February 2005 (15.02.2005)	(Earliest) Priority Date ( <i>day/month/year</i> ) 05 March 2004 (05.03.2004)
Applicant ALUMINA MICRO LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

#### 1. Basis of the Report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (See Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1



as suggested by the applicant.



None of the figures



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/04821

## Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

The abstract is too long (PCT Rule 8.1(b)). The abstract must be less than 150 words, or 200 words when no figure is to be published.

### NEW ABSTRACT

A method for forming a microvalve is disclosed. The method includes providing a first silicon layer (12) and a second silicon layer (14), etching the second silicon layer (14) to form a slider portion (40), coating a coating material onto the slider portion (40), bonding the first silicon layer (12) to the second silicon layer (14), wherein the coating material separates the slider portion (40) from the first silicon layer (12) and prevent the slider portion (40) from bonding to the first silicon layer (12).

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/04821

## A. CLASSIFICATION OF SUBJECT MATTER

IPC: A63B 37/02( 2006.01);39/00( 2006.01);B32B 37/00( 2006.01);38/04( 2006.01);B29C 65/00( 2006.01)  
B32B 5/02( 2006.01)

USPC: 156/81,155,272.2,275.7,289,290;422/50,99

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 156/81,155,272.2,275.7,289,290;422/50,99

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,096,149 (Hetrick et al) 1 August 2000 (1.08.2000), Col 1, lines 11-25, Col 3, lines 28-33, Col 3, lines 61-65, Col 4, lines 1-12, Col 4, lines 20-31, Col 4, lines 38-44, and Col 7, lines 18-25.	1-12, 21-30, and 32-38
X	US 6,116,863 (Ahn et al) 12 September 2000 (12.09.2000), Col 5, lines 20-43, Col 6, lines 1-58, and Col 7, lines 41-53)	13-20 and 31



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

07 August 2006 (07.08.2006)

Date of mailing of the international search report

01 SEP 2006

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US  
Commissioner of Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Authorized officer

Christopher A Fioritto

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# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:  
SHITAL A. SHAH  
MACMILLAN, SOBANSKI & TODD, LLC  
ONE MARITIME PLAZA, FOURTH FLOOR  
720 WATER STREET  
TOLEDO, OH 43604

# PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) **01 SEP 2006**

Applicant's or agent's file reference  
53-24871

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/US05/04821

International filing date (day/month/year)  
15 February 2005 (15.02.2005)

Priority date (day/month/year)  
05 March 2004 (05.03.2004)

International Patent Classification (IPC) or both national classification and IPC

IPC: Please See Continuation Sheet  
USPC: 156/81,155,272.2,275.7,289,290;422/50,99

Applicant

ALUMINA MICRO LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

## 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA-US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Date of completion of this opinion 07 August 2006 (07.08.2006)	Authorized officer Christopher A. Flotila Telephone No. 703-308-0661
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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US05/04821

**Box No. I Basis of this opinion**

1. With regard to the **language**, this opinion has been established on the basis of:
  - ☒ the international application in the language in which it was filed
  - ☐ a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material
    - ☐ on paper
    - ☐ in electronic form
  - c. time of filing/furnishing
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in electronic form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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**Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Claims <u>NONE</u>	YES
	Claims <u>1-38</u>	NO
Inventive step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-38</u>	NO
Industrial applicability (IA)	Claims <u>1-38</u>	YES
	Claims <u>NONE</u>	NO

**2. Citations and explanations:**

Claims 1-12, 21-30, and 32-38 lack novelty under PCT Article 33(2) as being anticipated by Hetrick et al (U.S. 6,096,149).

Hetrick et al discloses a method of forming a micromachined device. The method includes providing substrates such as silicon, polysilicon, silicon dioxide, silicon nitride and metal wafer (Col 3, lines 61-65) to form multilayer microstructure (Col 7, lines 18-25), with sacrificial layer deposited and then patterned by etching, which is also thinning the microstructure (Col 1, lines 11-25), applying an amorphous hydrogenated carbon doped with silicon material (Col 4, lines 1-12), which would includes material such as silicon nitride, to the etched microstructures (Col 4, lines 38-44), which provided an anti-adhesion coating, which also reduces friction between the moving parts (Col 3, lines 28-33) with a thickness of 100 Angstroms to 10 microns (Col 4, lines 20-31)

Claims 13-20 and 31 lack novelty under PCT Article 33(2) as being anticipated by Ahn et al (U.S. 6,116,863).

Ahn et al discloses a method of forming a microactuated device. The method includes providing substrates for a multi-layer device such as a microvalve (Col 5, lines 20-43), depositing a photoresist and patterned to form a mask, etching to form the structures (Col 6, lines 1-58), which thinning to form the structures, bonding the substrate together with an eutectic bonding process by depositing a conductive layer by using photoresist and patterned to from a mask to expose the mating surface, and depositing titanium 300 angstroms and gold 3000 angstroms to each substrate and bonding together at elevated temperature (Col 7, lines 41-53)

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US05/04821

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of IPC:

A63B 37/02( 2006.01),39/00( 2006.01);B32B 37/00( 2006.01),38/04( 2006.01);B29C 65/00( 2006.01)  
B32B 5/02( 2006.01)